fibre equally stretched in both cases, a most necessary condition, for I have found that the torsional rigidity is seriously affected by variation in stretching.

Means are provided by which I can effect the transfer of the gold balls from the beam to the side hooks or the reverse, or change their places without opening the window; but these and numerous other important details I must pass over.

Unfortunately accidents are liable to happen, and, as I know by dearly-bought experience, the gold balls may sometimes be precipitated down the central tube. I have recovered them sometimes by an india-rubber tube, let down through the window aperture, sucking at the other end until they closed the open end, when they could be drawn up. Latterly I have made use of a magnetised tuning-fork to pick up a very small fragment of iron tied to a silk line, by means of which I could draw up a diaphragm with anything that might have fallen upon it.

(*To be continued.*)

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE following list of Royal Scholarships, Medals and Prizes awarded July, 1894, in connection with the Royal College of Science, London, has just been issued:—First Year's Royal Scholarships: Robert Sowter, Arthur Ormiston Allen, Henry Thomas Davidge, John Bousfield Chambers. Second Year's Royal Scholarships: Robert William Forsyth, William Longshaw. Medals and Prizes: "Edward Forbes" Medal and Prize of Books for Biology, George Stephen West; "Murchison" Prize of Books for Geology, John James Green, Francis Chambers Harrison; "Murchison Medal," not awarded; "Tyndall" Prize of Books for Physics, Part I., Robert Sowter; "De la Beche" Medal for Mining, John Ball; "Bessemer" Medal and Prize of Books for Metallurgy, Charles Howard Sidebotham; "Frank Hatton" Prize of Books for Chemistry, John Thomas. Prizes of Books given by the Department of Science and Art: Mechanics, Harold Rigby Cullen; Astronomical Physics, Francis Richard Penn, Robert Sowter; Practical Chemistry, Bouchier Mervyn Cole Marshall; Mining, John Ball; Principles of Agriculture, William Wilson.

THE Council of the City and Guilds of London Institute have conferred the Fellowship of the Institute upon Dr. W. E. Sumpner, who was awarded the Diploma of Associate of the Institute in 1887, and has since, by many original and valuable researches, contributed to the advancement of the electrical industry.

SCIENTIFIC SERIALS.

American Journal of Science, July.—Spiral goniometry in its relation to the measurement of activity, by Carl Barus. One type of the spiral goniometer consists of a "dial" in the form of a circular plate, on one half of which a series of concentric semicircles are traced, and an "index" in the form of another plate, bounded on one side by a semicircle, and on the other by two symmetric confluent spirals, traced so that equal increments of angle correspond to equal radial increments. These two parts are mounted on the same axis in such a manner as to be capable of revolving independently. When they are connected by a spring and made to actuate a dynamometer, the angle between the fundamental diameters of the dial and index can be read off by counting the number of semicircles visible on the revolving disc. These will be apparently drawn out into circles, and can be counted at any speed. This gives a means for measuring the activity of motors. In another form, the index outline is not a spiral but a diameter, and the semicircles are cut off in the outline of a spiral.—On some methods for the determination of water, by S. L. Penfield. This difficult operation may be considerably facilitated by the use of special forms of bulb tubes, which enable the analyst to separate the expelled water from the mineral, and weigh it in a closed tube. Two bulbs are blown half-way along the length of the tube, and kept cool by a strip of wet cloth. The water is driven up into the first of these. After it is all expelled, the glass is fused down upon the substance, and the end containing the substance is pulled off. The water is then weighed in the remaining part of the tube. For cases where the water is only expelled with difficulty, the author uses a kind of charcoal furnace, protecting the glass by a sheet of platinum foil. For entirely decomposing a mineral by fusion with sodium carbonate, the substance is placed in a platinum boat inside the combustion tube, and a sheet of platinum is wrapped round the outside. The tube must be well supported, as it is apt to fuse, but it does not leak even at a full white heat. The method is accurate, and superior to the use of porcelain or platinum. The latter is found at high temperatures to permit of the passage of gases through its substance.—The detection of alkaline perchlorates associated with chlorides, chlorates, and nitrates, by F. A. Gooch and D. Albert Kreider. The chlorates are destroyed by treating with the strongest hydrochloric acid and evaporating to dryness. The nitrates are decomposed by a saturated solution of manganous chloride in the strongest hydrochloric acid, the manganese being then eliminated by sodium carbonate. The perchlorates are then tested for by fusing with anhydrous zinc chloride.

American Meteorological Journal, July.—Changes in the definitions of clouds since Howard, by H. H. Clayton. The author quotes extracts from various authorities to show that there has been a gradual evolution since Howard. Thus a distinction between high and low cirro-stratus and high and low cirro-cumulus has been established, and the lower forms called alto-stratus and alto-cumulus. The stratus has been separated into fog and low sheet clouds, and two distinct forms of rain cloud recognised. He agrees with Hildebrandsson that ten terms, all compounded of Howard's four fundamental types, would fully meet the requirements of practical meteorology.—The newspaper weather maps of the United States, by R. De C. Ward. The history of the publication of these maps is given, together with specimens of those now issued. At present only four daily papers in the United States print weather maps regularly. The *New York Herald* was the first paper to issue them in the United States, and it occasionally prints them now, to illustrate special weather conditions.—Psychrometer studies, by H. A. Hazen. This paper is a criticism of the introduction to the tables recently published by Dr. J. Hann, of Vienna, and has especial reference to the difficulty found in using the wet and dry bulb thermometers when the temperature is near or below the freezing point. Prof. Hazen states that nearly all the difficulty vanishes when the thermometers are well ventilated.—List of cloud photographs and lantern-slides, by R. De C. Ward. A list of typical cloud forms, classified according to the international system, has been prepared, with an explanation of each, for use in lectures. The photographs are chiefly from pictures taken by Riggenbach and Manucci, during various positions and conditions.

Wiedemann's Annalen der Physik und Chemie, No. 8.—On the mechanical effects of waves upon resonators at rest, by Peter Lebedew. The case of electromagnetic waves is the first dealt with. Instruments called magnetic and electric resonators, respectively, were constructed in such a manner that they could be suspended by quartz fibres parallel to the planes of their coils. One of these was arranged so as to resound to the magnetic, the other to the electric components of the waves only. It was found that both resonators behaved in the same way. When "tuned" to a higher pitch, they were attracted by the incident wave system; when tuned lower, they were repelled, the maximum effects occurring when most closely approaching perfect resonance. The phenomena can be explained by supposing that the excitation of electric resonators obeys the laws governing all elastic vibrations, and that the laws of Coulomb and Ampère with respect to the relation between impulse and motion also apply to electric oscillations. The experiments are analogous to attempts to elucidate the molecular forces attending the propagation of light.—On the velocities of sound in air, gases, and vapours for simple tones of different pitches, by James Webster Low. From experiments performed with a Quincke interference tube, it appears that, contrary to the results obtained by Kundt, Regnault, König, and others, for closed tubes, the velocity of sound in air and in carbonic acid is the same for notes of different pitch and intensity when they are propagated in open space.—On the seat of the electric charge in condensers, by A. Kleiner. The experiments were performed chiefly on mica condensers, one coating of which consisted of pure mercury, and the other of tinfoil. The discharges obtained after the coatings had been taken off and replaced were about 5 per cent. less than those from the undisturbed condenser.

©1894 Nature Publishing Group

When the mica sheet was split in two, approximately equal discharges were obtained from the original condenser and the condensers formed with each of the parts, thus exhibiting the analogy with a magnet when broken into parts.—On the magnetisation of iron cylinders, by O. Grotrian. The parts of an iron cylinder not too short in comparison with its diameter, magnetised by a homogeneous field in the direction of the axis, are very differently magnetised when saturation has not been reached, the outside parts being much more strongly magnetised than the axial ones.

SOCIETIES AND ACADEMIES.

LONDON.

Chemical Society, June 21.—Dr. H. E. Armstrong, President, in the chair.—The following papers were read: A specimen of early Scottish iron, by Miss M. D. Dougal.—The interaction of sulphide with sulphate and oxide of lead, by J. B. Hannay. The two equations—$PbS + PbSO_4 = 2Pb + 2SO_2$ and $PbS + 2PbO = 3Pb + SO_2$—given by Percy, to represent the reactions occurring in lead smelting, are insufficient. A much more complex reaction occurs, since metallic lead when formed attacks the remaining sulphate, producing litharge, which in turn reacts with the sulphide; further, some of the sulphide is removed by solution in the metallic lead, whilst some is volatilised as the compound PbS,SO_2.—The mineral waters of Cheltenham, by T. E. Thorpe.—The oxidation of tartaric acid in presence of iron, by H. J. H. Fenton. Tartaric acid is oxidised by certain agents in presence of a trace of ferrous salt with formation of a new crystalline dibasic acid, $C_4H_4O_6$, $2H_2O$; it is a powerful reducing agent, and forms crystalline salts.—The supposed relation between the solubility of a gas and the viscosity of its solvent, by T. E. Thorpe and J. W. Rodger. From the results of their own experiments on the viscosity of solutions of gases, the authors are led to modify the conclusions of Winkler respecting the relation between solubility and viscosity.—The specific character of the fermentative functions of yeast cells, by A. J. Brown. Pasteur's view of the cause of the exhibition of the fermentation functions of yeast cells is that it is a starvation phenomenon brought about by lack of free oxygen during the life of the cells in a fermentable liquid. The fermentative power was measured by Pasteur as the ratio of yeast to sugar; the author finds, however, that there is no direct constancy of proportion between the weight of yeast formed and of sugar fermented. Pasteur's experiments are consequently insufficient, and his theory unproven.—Observations on the influence of temperature on the optical activity of organic liquids, by P. Frankland and J. MacGregor. The authors have measured the rotatory powers of methylic and ethylic salts of active glyceric and diacetylglyceric acids at various temperatures; the percentage increase in rotation as the temperature rises is greater for the methylic than for the ethylic salts.—The maximum molecular deviation in the series of the ethereal salts of active diacetylglyceric acid, by P. Frankland and J. MacGregor.—The preparation of sulphonic derivatives of camphor, by F. S. Kipping and W. J. Pope. The sulphonic chlorides and bromides of camphor and its halogen derivatives are best prepared by treating the ammonium salts of the corresponding sulphonic acids with phosphoric chloride.—Dextro-rotatory camphorsulphonic chloride, by F. S. Kipping and W. J. Pope.—On the combination of chlorine with carbon monoxide under the influence of light; preliminary notice, by G. Dyson and A. Harden. There is a well-marked period of photochemical induction in the amount of chemical action occurring when light acts on a moist mixture of equal volumes of carbon monoxide and chlorine.—Solution and pseudo-solution, part ii., by S. E. Linder and H. Picton.—Solution and pseudo-solution, part iii., by H. Picton and S. E. Linder. The continuation of previous work on solutions is described in these two papers.

PARIS.

Academy of Sciences, July 23.—M. Lœwy in the chair.—On the photographs of the moon obtained with the great *coudé* equatorial of the Paris Observatory, by MM. Lœwy and Puiseux. The difficulties met with in taking these lunar photographs are detailed, and an account is given of the methods used in overcoming them. Further, the photographs obtained are discussed and compared with maps and previous photographs.—On a new series of sulphophosphides, the thiohypophosphates, by M. C. Friedel. The iron, aluminium, zinc, copper, lead, silver, mercury, and tin salts are described. The series is viewed as consisting of salts of the general type $P_2S_6M'_4$.—On two menhirs found in Meudon wood, by M. Berthelot. Two previously undescribed sandstone menhirs have their characteristics given in detail.—On the reduction of any differential system whatever to a completely integrable form, by M. Riquier. The conclusions of this memoir are summarised as follows:—"Being given a differential system involving any number of unknown functions and any number of independent variables, simple eliminations, together with differentiations, allow, in general, of putting them into a completely integrable form, of which the order is nearly always superior to one, and approximates to a linear and completely integrable form of the first order."—On the specific inductive capacity of glass, by M. F. Beaulard. The influence of the time of charging has been studied by the ballistic method and k calculated for an instantaneous charge, the author finds $k = 3·9$.—On the electrolysis of copper sulphate, by M. A. Chassy. With a neutral saturated solution of copper sulphate at 100° and a current density of a hundredth of an ampère per square centimetre, a bright red deposit of cuprite in forms derived from the cube and octahedron is obtained. By lowering the temperature, diminishing the concentration, or augmenting the current density, varying proportions of metallic copper can be obtained along with the red crystals. In determinations of current by electrolysis of copper sulphate it is necessary, in order to avoid serious error, to acidulate and pass the current through cold dilute solutions.—On manganese steel, by M. H. Le Chatelier. The anomalous results found previously by the author in studying the electric resistance of (13 per cent.) ferromanganese are explained by the formation of two allotropic varieties of the metal. The temperature of transformation is 740°, that temperature at which soft iron passes from the magnetic to the non-magnetic state.—On metaphthalodicyanacetic ether, by M. Locher.—Organo-metallic combinations of borneol, camphor, and monochlor-camphor with aluminium chloride, by M. G. Perier. The compounds having the formulæ

$$(C_{10}H_{18}O)_2Al_2Cl_6,\ (C_{10}H_{16}O)_2Al_2Cl_6,\ \text{and}\ (C_{10}H_{15}ClO)_2Al_2Cl_6$$

have been obtained in crystalline condition. They are very unstable in air, and are readily acted on by water with production of the original constituents.—On a new acid, isocampholic acid, by M. Guerbet.—Action of phosphorus pentachloride on tetrachloroquinone, by M. Et. Barral.—On essence of Pelargonium from Réunion, by MM. Ph. Barbier and L. Bouveault.—On the condensation of formaldehyde with alcohols of the fatty series in presence of hydrochloric acid, by M. C. Favre.—On the existence of hydroxyl in green plants, by M. A. Bach.—On the presence of several distinct kinds of chlorophyll in the same vegetable species, by M. A. Étard.—Researches on the causes of the toxicity of the serum of blood, by MM. Mairet and Bosc. The authors demonstrate the following conclusions:—(1) Blood serum has both toxic and coagulating properties. (2) The coagulating properties are destroyed by heat or by the addition of sodium chloride or sulphate. (3) The symptomatic effects produced by intravenous injections of pure serum are mostly due to the toxic properties of the serum, the coagulating effects making themselves felt only near the limit of the toxic action. (4) The alcoholic extract has no toxic or coagulating properties, these being only shown by the precipitate. (5) By partial precipitation with alcohol, the toxic and coagulating substances may be separated. (6) Both belong to the albumenoids.—On the structure of the membrane of Corti, by MM. P. Coÿne and Cannieu.—On the metamorphoses of *Cecidomyia destructor*, Say, and on the puparium or larval envelope before its transformation into a chrysalis, by M. A. Laboulbène.—On the origin of "sphères directrices," by M. Leon Guignard.—The radical tubercles of *Arachis hypogea*, L., by M. Henri Lecomte.—Influence of the distribution of humidity in the soil on the development of chlorosis of the vine on a calcareous soil, by MM. F. Houdaille and M. Mazade.—On a magnetic perturbation, by M. Moureaux.

BERLIN.

Physiological Society, June 8.—Prof. du Bois Reymond, President, in the chair.—Dr. J. Munk gave an account of an

©1894 Nature Publishing Group